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Title: The Effects of Perceived Teamwork on Emergent States and Satisfaction with Performance among Team Sport Athletes

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1 **Abstract**

2 Although teamwork has been shown to be an important group variable across a range of team
3 contexts, corresponding research within the context of sport has not yet been conducted. As such,
4 the purpose of this study was to examine the relationships between team sport athletes'
5 perceptions of teamwork behaviours with several individual and group variables within sport. A
6 sample of 178 team sport athletes completed the *Multidimensional Assessment of Teamwork in*
7 *Sport* (MATS), which measures five aspects of teamwork. One month later, participants
8 completed measures of team cohesion, collective efficacy, satisfaction with both team and
9 individual performance, enjoyment in one's sport, and commitment to one's team. The
10 correlations between each of the five aspects of teamwork with the six external variables were
11 significant ($p < .001$). Large effect sizes were found for the correlations between athletes'
12 perceptions of teamwork and their satisfaction with team performance, task cohesion, and
13 collective efficacy. Medium effect sizes were shown with social cohesion. Small-to-medium
14 effect sizes were evident with satisfaction with individual performance, commitment to one's
15 team, and enjoyment in one's sport. The relationships between each aspect of teamwork and
16 satisfaction with team performance were mediated by task cohesion, social cohesion, and
17 collective efficacy. The relationships between four of the five aspects of teamwork and
18 satisfaction with individual performance were mediated by enjoyment and commitment. The
19 results of this study suggest that teamwork is an important variable to consider within the context
20 of sport.

21 **Keywords:** Emergent states; Mediators; Processes; Teamwork; Validity

22 **The Effects of Perceived Teamwork on Emergent States and Satisfaction with Performance**
23 **among Team Sport Athletes**

24 The ability of team members to work well together has been identified as a significant
25 aspect of team effectiveness across a range of group contexts, such as business, health care,
26 military, and academic settings (LePine, Piccolo, Jackson, Mathieu, & Saul, 2008; Mathieu,
27 Maynard, Rapp, & Gilson, 2008). Specifically, the group-level construct of teamwork has been
28 shown to be associated with various group constructs, including team cohesion (i.e., the extent to
29 which team members are united around their group objectives), collective efficacy (i.e., the
30 confidence a team has in its collective abilities to perform team tasks), and, ultimately, team
31 performance (LePine et al., 2008). In addition to these group variables, team members'
32 perceptions of teamwork behaviors have also been found to be positively related to various
33 individual-level constructs such as commitment to one's team (Rafferty, Ball, & Aiken, 2001),
34 enjoyment/satisfaction within one's job/role on a team (LePine et al., 2008; Rafferty et al., 2001),
35 and, ultimately, individual team member performance (Stevens & Campion, 1999).

36 Despite the evidence suggesting that teamwork is an important variable to consider when
37 studying teams, research on this behavioral construct within the context of sport has been
38 surprisingly sparse. In an attempt to stimulate research in this context, McEwan and Beauchamp
39 (2014) conducted a theoretical and integrative review of the research on teamwork behaviors in
40 other contexts as well as the limited extant work conducted to date within sport. This resulted in
41 the provision of a working definition as well as a theoretical framework of teamwork in sport.
42 Specifically, teamwork was conceptualized as "a collaborative effort by team members to
43 effectively carry out the independent and interdependent behaviors that are required to maximize
44 a team's likelihood of achieving its purposes" (McEwan & Beauchamp, 2014, p. 233). The
45 multidimensional framework was largely informed by a prominent framework of teamwork

46 behaviors put forward by Rousseau, Aubé, and Savoie (2006)—which itself was based on a
47 comprehensive review of 29 models that have been used to study teamwork behaviors in other
48 team contexts (e.g., health care, aviation, business)—and adapted for use with sports teams.

49 There are five overarching components of teamwork—*preparation, execution, evaluation,*
50 *adjustments,* and the *management of team maintenance (MTM)*—which are comprised of 14
51 behavioral dimensions (McEwan & Beauchamp, 2014). *Preparation* involves behaviors that
52 occur in advance of a team task, which includes specifying a team’s mission/reasons for being
53 together (‘mission analysis’), team goals (‘goal specification’), and team strategizing
54 (‘planning’). *Execution* involves behaviors that are enacted during a team task, including
55 ‘communication’, ‘cooperation’, and ‘coordination’ between members. *Evaluation* and
56 *adjustments* occur after a team task. Evaluation involves assessing team performance on a
57 previous team task (‘performance monitoring’) as well as the various conditions affecting that
58 performance (‘systems monitoring’). Adjustments are then enacted in response to the team’s
59 evaluation and include deliberating how team performance can be improved (‘problem solving’),
60 implementing novel strategies to enhance team functioning (‘innovation’), providing
61 performance-related verbal feedback to teammates (‘intrateam coaching’), and enacting
62 behaviors that help teammates perform their roles (‘backing up’). Finally, *MTM* involves
63 behaviors associated with keeping the team together and ensuring that personal and/or
64 interpersonal issues do not preclude a team from functioning effectively; this includes dealing
65 with conflict between members (‘integrative conflict management’) and providing interpersonal
66 support to one another (‘psychological support’).

67 The teamwork in sport framework was also embedded within a broader *Input-Mediator-*
68 *Outcome (IMO)* model of team effectiveness (Mathieu et al., 2008) in order to illustrate how
69 teamwork relates to other salient constructs. *Inputs* are described as individual (e.g., members’

70 personalities, skills), team (e.g., team size, teamwork training), and environmental (e.g., league
71 rules, cultural influences) variables that can impact the interactions between team members
72 (Mathieu et al., 2008). *Mediators* include both team *processes* as well as *emergent states*. Team
73 processes entail team member behaviors and interactions (e.g., teamwork), while emergent states
74 refer to members' cognitive, motivational, and affective states (e.g., team cohesion, commitment
75 to one's team)—these states develop over time as a result of the aforementioned
76 processes/interactive behaviors between members (Mathieu et al., 2008; Marks et al., 2001). For
77 example, as team members learn and improve the extent to which they work effectively together,
78 they may become more committed to their team and more united in pursuit of their goals. These
79 processes and, in turn, emergent states are proposed to predict the extent to which teams achieve
80 various *outcomes*, which are the resulting outputs of team activities that are valued by the team
81 and/or its members (e.g., performance, member satisfaction; Mathieu et al., 2008; McEwan &
82 Beauchamp, 2014). Since teams are said to “exist to perform tasks” (Mathieu et al., 2008, p.
83 415), it is perhaps unsurprising that performance has been the most commonly studied criterion
84 within various contexts of team psychology (Bommer, Johnson, Rich, Podsakoff, & MacKenzie,
85 1995; Mathieu et al., 2008).

86 Building on this foundational base, McEwan, Zumbo, Eys, and Beauchamp (2018)
87 developed a conceptually- and psychometrically-sound measure of teamwork, entitled the
88 *Multidimensional Assessment of Teamwork in Sport (MATS)*. This questionnaire measures the 14
89 aforementioned dimensions of teamwork and can also be used to derive scores on each of the five
90 overarching aspects. Preliminary evidence provided support for the reliability as well as content,
91 substantive, and structural validity of data derived from the MATS (McEwan et al., 2018).
92 However, it remains to be ascertained whether (and the extent to which) teamwork is associated
93 with other salient variables in sport. This research is critical from a construct validation

94 perspective, as it tests the *external* component of validity, which concerns the degree to which
95 data derived from a focal construct (in this case, teamwork) are related to other theoretically-
96 relevant constructs (cf. Messick, 1995).

97 Within the theoretical framework of teamwork in sport provided by McEwan and
98 Beauchamp (2014), it is suggested that teamwork predicts an array of group and individual
99 emergent states and outcomes. As mentioned, the relationships between teamwork with these
100 emergent states—including team cohesion and collective efficacy—and outcomes—including
101 team performance and member satisfaction—have been found across several team contexts
102 outside of sport (e.g., LePine et al., 2008; McEwan, Ruissen, Eys, Zumbo, & Beauchamp, 2017).
103 In addition, the predictive effects of various emergent states on team and individual outcomes
104 have been shown with sport teams (e.g., Barnicle & Burton, 2016; Carron, Colman, Wheeler, &
105 Stevens, 2002; Heuzé, Raimbault, & Fontayne, 2006; Myers, Feltz, & Short, 2004). For example,
106 a meta-analysis by Carron et al. (2002) found that team cohesion was a significant predictor of
107 team performance in sport. However, an examination of whether—and the extent to which—
108 teamwork acts as an antecedent to the various emergent state–performance relationships in sport
109 has not yet been conducted.

110 **The Current Study**

111 In light of the potential importance of teamwork within sport (based on corresponding
112 research on teamwork within other team contexts), the purpose of this study was to examine the
113 relationships between team sport athletes' perceptions of teamwork (including preparation,
114 execution, evaluation, adjustments, and MTM) and six salient constructs in sport. These included
115 a group outcome of satisfaction with team performance, two group emergent states of team
116 cohesion and collective efficacy, an individual outcome of satisfaction with one's personal
117 performance, and two individual emergent states of commitment to one's team and enjoyment in

118 one's sport. As a primary hypothesis, it was anticipated that significant, positive correlations
119 would emerge between the five aspects of teamwork (preparation, execution, evaluation,
120 adjustments, and MTM) with these six external variables. Such relationships have been shown in
121 other team contexts (e.g., LePine et al., 2008; Rafferty et al., 2001; Stevens & Campion, 1999)
122 and, thus, it was predicted that these results would extend to sport settings.

123 Potential mediating effects between the five aspects of teamwork (as antecedents) and
124 satisfaction with both team and individual performance (as outcomes) were also examined.
125 Specifically, it was hypothesized that athletes' perceptions of teamwork would predict their
126 satisfaction with their team's performance via the emergent states of team cohesion (both task
127 and social) and collective efficacy. It was also hypothesized that perceived teamwork would
128 predict satisfaction with individual performance via enjoyment in one's sport and commitment to
129 one's team. Although objective measures may be ideal for estimating team and individual
130 performance, such assessments are challenging to obtain with the context of team sports (Al-
131 Yaaribi, Kavussanu, & Ring, 2016), especially when sampling from several types of sports.
132 Moreover, team member satisfaction has been examined as a prominent criterion in the teamwork
133 literature (e.g., LePine et al., 2008). As such, a self-report measure of satisfaction with team and
134 individual performance was used to examine this outcome. These proposed relationships were
135 guided by the framework of team effectiveness by McEwan and Beauchamp (2014), by previous
136 findings on teamwork in other team contexts (e.g., Mathieu et al., 2008; LePine et al., 2008;
137 Rousseau et al., 2006), as well as by previous research within sport on the relationships between
138 the aforementioned mediating variables and performance outcomes (e.g., Barnicle & Burton,
139 2016; Carron et al., 2002; Myers et al., 2004). In summary, each test for mediation followed the
140 proceeding model: teamwork → emergent state → satisfaction with performance.

141 **Methods**

142 **Participants**

143 The sample for the current study consisted of 178 athletes (85% males) from 19 Canadian
144 sports teams, who completed questionnaires at both time 1 and time 2 (see below). Five teams
145 were adult-aged (≥ 18 years), while the remaining 13 were adolescents (mean age = 17.3 years,
146 SD = 8.3, range = 13 – 73). These teams competed in a range of sports, including hockey (five),
147 baseball (five), curling (three), water polo (two), volleyball (one), rugby (one), lacrosse (one),
148 and soccer (one). The majority of the athletes came from competitive teams ($n = 16$) who were
149 selected following team tryouts to compete predominantly against other teams within their local
150 region (often known in Canada as ‘rep’ teams), while two teams competed at the provincial level,
151 and one competed at the inter-University level.

152 The sample size required to carry out the planned mediation analyses (see Analytic
153 Strategy section below) was guided by recommendations from Fritz and MacKinnon (2007).
154 Based on previous findings with regard to the relationships between (a) teamwork and emergent
155 states (LePine et al., 2008), and (b) emergent states with performance (e.g., Barnicle & Burton,
156 2016; Carron et al., 2002; Myers et al., 2004), a minimum of 116 participants was necessary for a
157 power estimate of $\beta = .80$. As such, the final sample size of 178 athletes was deemed appropriate
158 to address the purposes of this study.

159 **Procedure**

160 Following institutional research ethics board approval, team coaches or managers were
161 contacted over email via publicly-available contact information and asked to participate in the
162 study. The researcher met with teams whose coaches indicated that they would be interested in
163 participating in the study at an approximate halfway point of the team’s season—this typically
164 occurred 4 – 5 months following the commencement of the season (range = 2 – 6 months). Two

165 study sessions—each lasting approximately 15 – 20 minutes—were scheduled before or after a
166 team’s practice at team practice facilities. For participating teams whose athletes were under the
167 age of 18, passive consent was obtained from parents wherein they were able to opt their child
168 out of the study prior to the first study session (no instances of opt out occurred). At the first
169 study session, participants provided informed consent and then completed a demographic form as
170 well as the teamwork in sport questionnaire (see below). The second session took place
171 approximately one month following the time 1 assessment, where participants completed
172 measures of team cohesion, collective efficacy, satisfaction with team performance, enjoyment in
173 one’s sport, commitment to one’s team, and satisfaction with individual performance. Two
174 measures of reliability are provided for all measures, below: ordinal composite reliability
175 (Zumbo, Gadermann, & Zeisser, 2007) and Cronbach’s alpha (Cronbach, 1951).

176 **Materials**

177 **Time 1.** At the first session of the study, participants completed the *MATS*, a 66-item
178 questionnaire that examines each of the 14 dimensions of teamwork at the group level (i.e.,
179 athletes’ perceptions of teammate behaviors; McEwan et al., 2018). Each item is scored on a 7-
180 point Likert-type scale from 1 (strongly disagree) to 7 (strongly agree). The preparation subscale
181 measures the dimensions of ‘mission analysis’ (5 items; e.g., “our team has specified a mission
182 on which all members agree”), ‘goal specification’ (6 items; e.g., “we set challenging team
183 goals”), and ‘planning’ (6 items; e.g., “we make action plans for how we will achieve our team
184 goals”). The execution subscale examines the ‘coordination’ (4 items; e.g., “team members
185 execute their tasks with the correct timing”), ‘cooperation’ (4 items; e.g., “team members help
186 each other when needed”), and ‘communication’ (5 items; e.g., “team members communicate in a
187 clear manner”) dimensions. The evaluation subscale consists of the ‘performance monitoring’ (6
188 items; e.g., “we evaluate our progression towards team goal accomplishment”) and ‘systems

189 monitoring' (4 items; e.g., "we monitor external factors that may impact our team") dimensions.
190 The adjustments subscale measures the dimensions corresponding to 'problem solving' (4 items;
191 e.g., "if our team is unsuccessful, we identify the reasons why this has occurred"), 'innovation' (4
192 items; e.g., "we utilize new tactics when previous plans prove to be unsuccessful"), 'intrateam
193 coaching' (4 items; e.g., "members of this team take time to give advice to each other on their
194 personal performance"), and 'backing up' (5 items; e.g., "teammates take time to help other
195 members perform better"). Finally, the MTM subscale assesses the 'integrative conflict
196 management' (4 items; e.g., "conflicts are resolved in a time-efficient manner") and
197 'psychological support' (5 items; e.g., "members provide support to teammates who are
198 experiencing personal struggles") dimensions.

199 Participants' perceived level of teamwork was assessed by calculating their mean observed
200 scores (from 1 to 7) on each of the dimensions within each respective subscale (e.g., a score for
201 execution was provided by calculating participants' mean coordination, cooperation, and
202 communication scores). Higher observed scores reflect higher perceived levels of teamwork.
203 Evidence of content, substantive, and structural validity, as well as reliability and good model-
204 data fit, has been demonstrated for each of the five measurement models corresponding to the
205 preparation, execution, evaluation, adjustments, and MTM aspects of teamwork (McEwan et al.,
206 2018). In the current study, ordinal composite reliabilities (Zumbo et al., 2007) ranged from .91
207 (mission analysis, performance monitoring, and systems monitoring) to .96 (psychological
208 support). Cronbach's alpha values ranged from .87 (systems monitoring and problem solving) to
209 .95 (psychological support).

210 **Time 2.** To examine team cohesion, adult participants (5 teams, 37 athletes) completed the
211 18-item *Group Environment Questionnaire* (GEQ; Carron, Widmeyer, & Brawley, 1985), while
212 adolescent participants (13 teams, 141 athletes) completed the 18-item *Youth Sport Environment*

213 *Questionnaire* (YSEQ; Eys, Lougheed, Bray, & Carron, 2009). Measures of task cohesion (the
214 extent to which team members are united around their team's *instrumental* objectives) as well as
215 social cohesion (the extent to which team members are united around the group's *social*
216 activities/relationships) are provided (Carron et al., 1985; Eys et al., 2009). In both
217 questionnaires, items are scored on a 9-point scale, from 1 (strongly disagree) to 9 (strongly
218 agree); higher scores on the two measures indicate greater perceptions of task and social
219 cohesion. Support has been shown for the validity and reliability of data derived from both the
220 GEQ (Carron et al., 1985) and the YSEQ (Eys et al., 2009). It should be noted that although the
221 GEQ can measure four aspects of cohesion (specifically, individuals' attractions to a group's task
222 and social objectives as well as their perceptions of the group as a whole on these two types of
223 objectives; cf. Carron et al., 1985), it has often been conceptualized as social cohesion and task
224 cohesion (such as within the prominent meta-analysis by Carron et al., 2002). Moreover, when
225 separated into these four subscales in the current study, the reliability estimates for Attractions to
226 the Group – Task (.51) and Group Integration – Task (.66) were particularly problematic (cf.
227 Cortina, 1993; Zumbo et al., 2007). As such, the GEQ items were separated into social cohesion
228 and task cohesion. In the current study, ordinal composite reliability scores for measures of the
229 GEQ were .89 for task cohesion and .88 for social cohesion, while Cronbach's alpha values were
230 .87 for task cohesion and .82 for social cohesion. For the YSEQ, ordinal composite reliability
231 scores were .90 for task cohesion and .85 for social cohesion, while Cronbach's alpha was .95 for
232 task cohesion and for .92 social cohesion.

233 The *Collective Efficacy Questionnaire for Sports* (Short, Sullivan, & Feltz, 2005) was used
234 to measure collective efficacy. Specifically, the 4-item *Ability* subscale of this questionnaire
235 examines participants' confidence in their team's collective ability to outperform opposing teams,
236 as this was the variable of interest with regard to athletes' perceptions of collective efficacy.

237 Items are scored on a 10-point scale from 1 (not at all confident) to 10 (extremely confident);
238 thus, higher scores indicate higher levels of collective efficacy. Previous studies have found
239 support for the reliability and validity related to data derived from this instrument (Short et al.,
240 2005). In the current study, ordinal composite reliability was .97 and Cronbach's alpha was .96.

241 The *Athlete Satisfaction Questionnaire* (Reimer & Chelladurai, 1998) was used to measure
242 participants' satisfaction with performance. Athletes' satisfaction with their team's performance
243 was assessed with the 3-item *Team Performance* subscale of this instrument. Satisfaction with
244 one's individual performance was examined with the 3-item *Individual Performance* subscale.
245 Items are scored using a 7-point scale from 1 (not at all satisfied) to 7 (extremely satisfied), with
246 higher scores indicating greater satisfaction with performance. Support for the reliability and
247 validity of data derived from both subscales of this questionnaire have been shown (Reimer &
248 Chelladurai, 1998). For satisfaction with team performance, ordinal composite reliability in the
249 current study was .95 and Cronbach's alpha was .90. For satisfaction with individual
250 performance, ordinal composite reliability was .91 and Cronbach's alpha was .84.

251 The *Sport Commitment Model* (Scanlan, Carpenter, Schmidt, Simons, & Keeler, 1993) was
252 used to measure participants' ratings of enjoyment in their sport as well as their commitment to
253 their team. The 4-item *Sport Enjoyment* subscale was used to measure enjoyment. Items from this
254 subscale are scored on a 5-point scale from 1 (not at all) to 5 (very much). The 4-item *Sport*
255 *Commitment* subscale was used to measure commitment. Three of the items from this subscale
256 are measured on a 5-point scale from 1 (not at all) to 5 (very much), while one item is measured
257 on a separate 5-point scale from 1 (nothing at all) to 5 (a lot of things). Higher scores on both
258 subscales reflect higher levels of enjoyment and commitment. Evidence of reliability and validity
259 of data derived from both subscales of this instrument has been found (Scanlan et al., 1993). In

260 the current study, ordinal composite reliability was .96 for enjoyment and .92 for commitment,
261 while Cronbach's alpha was .93 for enjoyment and .89 for commitment.

262 **Analytic Strategy**

263 Data were analyzed using *SPSS* software (Version 24; IBM SPSS Predictive Analytics,
264 Chicago IL). After checking for normality and missing data, descriptive statistics were
265 represented by calculating sample sizes, means, and standard deviations for each variable.
266 Bivariate correlations (r) were calculated between the five aspects of teamwork with: satisfaction
267 with team and individual performance; task and social cohesion; collective efficacy; enjoyment;
268 and commitment. Correlations of .1, .3, and .5 correspond to small, medium, and large effect
269 sizes, respectively (Cohen, 1992).

270 To examine the potential mediating relationships, the PROCESS SPSS macro was used,
271 with bootstrapping set at 5000 samples (Hayes, 2013). Bootstrapping is recommended in
272 mediation analyses with small sample sizes to help reduce the risk of type 1 error (Fritz &
273 MacKinnon, 2007). The PROCESS macro handles missing data using listwise deletion and
274 simultaneously tests both the direct effects of the independent variable (teamwork) on the
275 dependent variables (satisfaction with team or individual performance) as well as the indirect
276 effects of this relationship via the mediating variables (cohesion, collective efficacy, enjoyment,
277 or commitment). These effects are significant if the resulting 95% confidence interval does not
278 contain zero. Effect sizes are also estimated with completely standardized indirect effects (CSIE),
279 with values of .01, .09, and .25 representing small, medium, and large effects, respectively
280 (Cohen, 1992).

281 As there are five aspects of teamwork, five separate mediation models were carried out to
282 assess whether each of these aspects predicted a mediating variable, which, in turn, predicted
283 satisfaction with performance. For example, to measure whether teamwork predicted satisfaction

284 with team performance via task cohesion, the first model included scores of preparation as the
285 independent variable (i.e., preparation → task cohesion → satisfaction with team performance).
286 Similar models were then carried out with execution, evaluation, adjustments, and MTM as the
287 independent variables. This process was repeated for each of the other mediation analyses.

288 Results

289 Prospective Correlational Relationships

290 Missing data, means, standard deviations, as well as the bivariate correlations among all
291 variables are shown in Table 1. Listwise deletion was considered appropriate to handle missing
292 data in this dataset as less than 5% of data for each measure were missing (cf. Schafer, 1999;
293 Tabachnick & Fidell, 2001). Large, significant ($p < .001$) effect sizes were evident for the
294 correlations between perceptions of teamwork and task cohesion¹ ($r = .49 - .69$), collective
295 efficacy ($r = .50 - .63$), and satisfaction with team performance ($r = .48 - .61$). A medium,
296 significant ($p < .001$) effect size was shown between perceived teamwork and social cohesion¹ (r
297 = $.33 - .36$). Small to medium, significant ($p < .001$) effect sizes were shown between
298 perceptions of teamwork and satisfaction with individual performance ($r = .23 - .35$),
299 commitment to one's team ($r = .19 - .37$), and enjoyment in one's sport ($r = .20 - .32$).

300 Mediators of Teamwork and Satisfaction with Team Performance

301 As shown in Table 2 presenting the mediation tests of task cohesion¹, all aspects of
302 teamwork had significant, direct effects on satisfaction with team performance ($B = .22 - .36$).
303 Teamwork also had significant, indirect effects on satisfaction with team performance via task

¹ Note: It is recognized that cohesion is measured with two different questionnaires based on participant age range (as noted in the Methods section). Specifically, the YSEQ is used with adolescent athletes and the GEQ is used with adult athletes. It should be noted that the results between teamwork and cohesion (in terms of both prospective correlations and mediation effects) were very similar for both the YSEQ and the GEQ and the overall findings did not change when the data from both questionnaires/age groups were combined. Therefore, for ease of reading, an amalgamated score for both social cohesion and task cohesion is presented throughout the results section.

304 cohesion ($B = .39 - .50$), with these effect sizes in the large range ($B = .28 - .37$). With regard to
305 social cohesion¹ (see Table 3), it was shown that all aspects of teamwork had significant, direct
306 effects on satisfaction with team performance ($B = .53 - .69$). Teamwork also had significant,
307 indirect effects on satisfaction with team performance via social cohesion ($B = .09 - .14$), with
308 these effect sizes in the approximate small to medium range ($B = .07 - .10$). Regarding collective
309 efficacy (see Table 4), all aspects of teamwork had significant, direct effects on satisfaction with
310 team performance ($B = .23 - .40$). Teamwork also had significant, indirect effects on satisfaction
311 with team performance via collective efficacy ($B = .31 - .52$), with these effect sizes in the large
312 range ($B = .29 - .37$). Taken together, these findings suggest that the relationships between
313 teamwork and satisfaction with team performance are partially mediated—to a large extent—by
314 the extent to which team members are (a) united around their task purposes and (b) confident in
315 the team's ability to be successful, as well as—to a small to medium extent—by the degree to
316 which team members are united around their social objectives.

317 **Mediators of Teamwork and Satisfaction with Individual Performance**

318 As shown in Table 5 examining the mediating effect of enjoyment, teamwork had
319 significant, direct effects on satisfaction with individual performance ($B = .12 - .21$). Significant,
320 indirect effects were also found on satisfaction with individual performance via enjoyment for the
321 preparation, execution, adjustments, and MTM aspects of teamwork ($B = .07 - .12$), with these
322 effects in the small to medium range ($B = .08 - .12$). The indirect effect in the model examining
323 the evaluation aspect of teamwork was similar but not significant, as the confidence interval ($-.01$
324 $- .17$) crossed zero. With regard to commitment (see Table 6), teamwork had significant, direct
325 effects on satisfaction with individual performance ($B = .14 - .21$). Similar to the above-noted
326 findings of enjoyment, there were significant, indirect effects on satisfaction with individual
327 performance via commitment for the preparation, execution, adjustments, and MTM aspects of

328 teamwork ($B = .05 - .11$), with these effects in the small to medium range ($B = .06 - .12$). The
329 indirect effect in the model for the evaluation aspect of teamwork was similar but not significant,
330 as the confidence interval ($-.01 - .15$) crossed zero. Taken together, these findings suggest that
331 the extent to which athletes enjoyed participating in their sport and were committed to their team
332 partially mediated the relationships of teamwork preparation, execution, adjustments, and MTM
333 (but not evaluation) on satisfaction with individual performance.

334 **Discussion**

335 The purpose of this study was to examine potential prospective and mediating relationships
336 between athletes' perceptions of teamwork and their ratings on several salient variables in sport.
337 Although previous studies have examined correlates of teamwork across an array of team
338 settings, the present study is notable as it appears to be the first to examine these external
339 relationships within the context of sport. First, it was hypothesized that perceived teamwork
340 would be positively related to various group constructs—team cohesion, collective efficacy, and
341 satisfaction with team performance—and individual variables—enjoyment within one's sport,
342 commitment to one's team, and satisfaction with one's individual performance—which were
343 measured approximately one month thereafter. Second, it was hypothesized that athletes'
344 perceptions of teamwork would predict their satisfaction with team performance via team
345 cohesion (both task and social) and via collective efficacy. Finally, it was anticipated that
346 perceived teamwork would also predict athletes' satisfaction with their own individual
347 performance via enjoyment in their sport and via commitment to their team. The results
348 pertaining to each of these hypotheses are discussed in turn below.

349 **Prospective Relationships**

350 The hypotheses regarding the positive prospective relationships between perceived
351 teamwork and the six external variables were supported, which corroborates previous findings

352 from other team contexts on correlates of teamwork (e.g., LePine et al., 2008; Mathieu et al.,
353 2008; Rafferty et al., 2001; Stevens & Campion, 1999). Thus, the extent to which sport team
354 members believe their teammates work well together appears to correlate (to a large extent) with
355 the degree to which they are: (a) united around the team's task purposes, (b) confident in their
356 team's collective abilities to be successful in their sport, and (c) satisfied with their team's
357 performance. Moreover, athletes' perceived teamwork appears to be correlated (to a small to
358 moderate extent) with the degree to which they: (a) believe that their team members are united
359 around its social activities; (b) enjoy participating in their sport; (c) are committed to their team;
360 and (d) are satisfied with their personal performance in their sport. The smaller correlations that
361 were evident between teamwork and the individual-level measures (i.e., enjoyment, commitment,
362 satisfaction with individual performance) compared to most of the group-level variables (i.e.,
363 collective efficacy, task cohesion, satisfaction with team performance) are perhaps unsurprising
364 given that teamwork was conceptualized and measured as a group construct (cf. McEwan et al.,
365 2018; Rousseau et al., 2006). Hence, one might expect an athlete's ratings on group constructs to
366 be correlated to a greater extent with each other than with individual variables. These results
367 align with findings from previous meta-analytic research (LePine et al., 2008), which has
368 demonstrated stronger correlations of teamwork with group-level variables (e.g., cohesion)
369 compared to individual-level variables (e.g., member satisfaction).

370 It is also worth noting that the sizes of the prospective relationships between athletes'
371 ratings of teamwork and task cohesion were larger than those between perceived teamwork and
372 social cohesion. At this point, one can only speculate why this finding occurred since (a) these
373 results were cross-sectional and (b) most of the previous research on teamwork and cohesion in
374 other team contexts appears to have used an amalgamated/omnibus measure of team cohesion
375 (e.g., LePine et al., 2008). However, it would seem reasonable to hypothesize that this finding

376 emerged due to teamwork reflecting the extent to which team members work well together in
377 order to *achieve the team's purposes* (cf. McEwan & Beauchamp, 2014). Since the purposes of
378 competitive sports teams (which were the types of teams included in this sample) often focus on
379 fulfilling *task* or *instrumental* objectives (e.g., performing well as a team, winning games or
380 competitions), it is perhaps unsurprising that athletes' perceptions of teamwork would tie more
381 closely to the extent to which they feel their team is united around those instrumental purposes
382 (i.e., task cohesion) as opposed to around its social objectives/interpersonal relationships (i.e.,
383 social cohesion). Future research could examine whether similar findings exist with less
384 competitive teams (e.g., intramural or recreational sports teams) whose purposes may be more
385 focused on social objectives (e.g., to make friends, to have fun while being active).

386 **Mediating Effects with Group Variables**

387 With regard to group variables, the results from this study not only suggest that athletes'
388 perceptions of teamwork predict their satisfaction with their team's performance, but also provide
389 evidence that these relationships are explained by their perceptions of team cohesion as well as
390 collective efficacy. Specifically, large indirect effects of task cohesion were shown for the
391 teamwork–performance relationship. In other words, athletes who perceive that members of their
392 team work effectively together appear to have a greater feeling of unity around their team's task
393 purposes, which, in turn, predicts the extent to which they are satisfied with that team's
394 performance. In addition, significant mediating effects were also shown for social cohesion,
395 albeit to a lesser extent (that is, to a small to medium effect). Thus, when athletes believe that
396 their teammates work well together, they will be more likely to perceive a greater sense of unity
397 around the team's social objectives and, thereby, experience greater satisfaction with their team's
398 performance. Similar to what was noted in the previous paragraph, the relatively smaller
399 mediating effects of social cohesion (compared to task cohesion) may be due to the construct of

400 teamwork being more closely related to the instrumental objectives of a team rather than its social
401 objectives. These results corroborate and extend the findings from previous research on (a)
402 teamwork in team settings outside of sport, as well as (b) the predictive relationship between
403 team cohesion and team performance in sport. Specifically, a meta-analytic review found that
404 various aspects of teamwork predict both team cohesion and team performance across an array of
405 team contexts (LePine et al., 2008). Another meta-analysis within the context of sport found that
406 both task and social cohesion predict team performance (Carron et al., 2002). This study adds to
407 those findings by demonstrating that athletes' perceptions of teamwork may act as an antecedent
408 to the cohesion–performance relationship (although future research is necessary to confirm that
409 these mediating effects exist with objective measures of team performance).

410 Large effects were also found when collective efficacy was examined as the mechanism
411 between the teamwork–performance relationship. This suggests that athletes who have greater
412 perceptions of teamwork later demonstrate greater confidence in their team's abilities to be
413 successful, which subsequently predicts their satisfaction with the team's performance. As with
414 the aforementioned findings on the mediating effects of team cohesion, these results also support
415 and extend previous research within and outside of sport. Namely, research in other team
416 contexts has been shown that team members' perceptions of various aspects of teamwork predict
417 their beliefs that the team can be effective (LePine et al., 2008). In addition, studies with athletes
418 have found that perceptions of collective efficacy predict team performance (e.g., Heuzé et al.,
419 2006; Myers et al., 2004). Hence, the results of the current study help connect the findings from
420 these two areas of research. Taken together, the collection of findings on these group variables
421 help shed light on how athletes' ratings of teamwork can subsequently impact various emergent
422 states (i.e., cohesion and collective efficacy), which, in turn, can predict their satisfaction with
423 their team's performance.

424 **Mediating Effects with Individual Variables**

425 Mediating effects were also evident when examining the relationships between perceived
426 teamwork and the three individual constructs—satisfaction with individual performance,
427 enjoyment in one’s sport, and commitment to one’s team. Specifically, the relationships between
428 athletes’ ratings of preparation, execution, adjustments, and MTM with satisfaction in one’s
429 individual performance were mediated by athletes’ enjoyment in their sport as well as their
430 commitment to their team. These findings align with the results from previous studies within
431 sport in terms of the positive relationships that have been shown between individual performance
432 with both enjoyment (e.g., Barnicle & Burton, 2016) and commitment (e.g., Al-Yaaribi et al.,
433 2016). Various aspects of teamwork have also been shown to predict omnibus measures of team
434 member satisfaction (e.g., LePine et al., 2008). The results from the current study adds to the
435 teamwork in sport literature by demonstrating that (a) teamwork is a positive predictor of
436 satisfaction with one’s individual performance specifically, and (b) enjoyment and commitment
437 are two of the mechanisms that explain this relationship.

438 As previously noted, it is perhaps unsurprising that the mediating effects were smaller for
439 these individual variables compared to the aforementioned group variables of task cohesion and
440 collective efficacy, since teamwork has been conceptualized as a group variable (cf. McEwan et
441 al., 2018). At this point, it is unclear why the significant mediating effects of enjoyment and
442 commitment did not emerge for the evaluation aspect of teamwork. It should be recognized,
443 however, that the effect sizes and accompanying confidence intervals for these mediating
444 variables were quite similar across all five models of teamwork. For example, the lower limit of
445 the confidence interval was barely below zero for the evaluation phase (-.01) and barely above
446 zero for the execution phase (+.00). Hence, caution should be exercised in interpreting these
447 types of findings wherein the confidence interval values that determine whether a mediating

448 effect is significant or not are all so close to zero. In sum, it could be *tentatively* concluded that
449 athletes' perceptions of teamwork may predict (to a small or perhaps even marginal extent) the
450 degree to which they will enjoy participating in their sport and will be committed to their team; in
451 turn, these latter two variables might predict the extent to which athletes are satisfied with their
452 own personal performance within their sport.

453 **Limitations**

454 In spite of the insights provided by this study, several limitations are worth noting. First,
455 since the teams in this sample came from an array of sports and age groups, we were unable to
456 obtain any objective measures of performance, as performance indices vary across sports (e.g.,
457 legal body checks in ice-hockey versus base-hits in baseball) and age groups (e.g., legal body
458 checks in ice-hockey would not be relevant to younger age groups where body checking is
459 prohibited). Thus, a subjective measure of *satisfaction* with performance was utilized. Although
460 member satisfaction has been a prominent indicator of team effectiveness in previous teamwork
461 research (e.g., LePine et al., 2008) and could certainly be viewed as a salient outcome within
462 sport, it should not be conflated with an objective indicator of performance (team or individual).
463 In addition, the sample was unintentionally comprised of 85% males, and also consisted of only
464 one team that competed at the national level and two teams that competed at the provincial level.
465 Although the remaining teams were competitive in nature, they were in a relatively lower level of
466 competition—that is, teams who were selected to compete against other teams around their
467 geographical area (i.e., 'rep' teams). While there does not appear to be any theoretical reason (cf.
468 McEwan & Beauchamp, 2014) to hypothesize that the results obtained in this study would not
469 extend to teams competing at the highest echelons of competition (e.g., professional or Olympic
470 teams), additional research is nonetheless required in order to test the generalizability of these
471 findings. Moreover, it is worth noting that the variables in this study were measured at the

472 individual level, as opposed to analysing the data at an aggregate/team level (e.g., with multilevel
473 modelling), due to limitations in sample size. Hence, it is important to reiterate that the results
474 from this study provide insight into athletes' *individual perceptions* of themselves and their teams
475 (as opposed to teammates' shared perceptions, for example, on these variables).

476 **Additional Potential Avenues of Future Research**

477 Overall, the results from this study provide further evidence of *construct validity*—namely,
478 the external aspect of validity (cf. Messick, 1995)—with regard to teamwork in sport (as
479 measured by the MATS). Nonetheless, as this was the first study to examine the relationships
480 between teamwork and various external measures within sport, there are some notable gaps
481 within this literature that could be addressed through further research. For one, researchers
482 studying teamwork in sport should continue to examine other components of the team
483 effectiveness framework proposed by McEwan and Beauchamp (2014). One particular avenue
484 might include examining the impact of various input variables on teamwork at the individual
485 (e.g., team member personalities, competencies), team (e.g., team size, level of interdependence
486 across sports), and broader organizational/external (e.g., organizational funding, cross-cultural
487 differences) levels. Moreover, now that there appears to be initial evidence that athletes'
488 individual perceptions of teamwork are related to their perceptions of the other variables
489 measured in this study, researchers could examine these (or additional variables) at the group
490 level with larger sample sizes in future studies. For example, multilevel modelling should be
491 conducted to account for the nesting of data from team sport athletes and examine how teamwork
492 relates to various constructs at both the individual-level (i.e., level 1) *and* the cluster-/team-level
493 (i.e., level 2).

494 It has also been hypothesized (cf. Marks et al., 2001; McEwan & Beauchamp, 2014) that
495 teamwork is impacted by various developmental processes and episodic cycles that teams go

496 through over time (e.g., from one game to another). This dynamic component of team
497 effectiveness could be examined in future studies by exploring teamwork and its relationships to
498 other pertinent variables at multiple points over time, such as from the start of the team's season
499 to the midway point to the end of the season. Such research could also shed further light on the
500 extent to which team processes (e.g., teamwork) and emergent states affect each other over the
501 course of a team's tenure. Specifically, although emergent states are conceptualized as by-
502 products that derive from teamwork (cf. Marks et al., 2001; Mathieu et al., 2008; McEwan &
503 Beauchamp, 2014), they may also impact teamwork behaviors over time. Longitudinal research
504 wherein measures of both teamwork and emergent states are taken at multiple time-points would
505 allow researchers to examine whether—and the extent to which—there is indeed a reciprocal
506 relationship between these two types of variables.

507 Finally, it has been shown that the five aspect of teamwork in sport can be enhanced
508 through intervention (McEwan & Beauchamp, 2018). Specifically, McEwan and Beauchamp
509 (2018) found significant improvements in athletes' perceptions of teamwork following
510 participation in teamwork training (which included various team building strategies such as team
511 goal setting, teamwork execution simulations, team charters, and so forth) over the course of ten
512 weeks relative to athletes who did not take part in training (whose perceptions of teamwork
513 remained mostly unchanged). Hence, one might reasonably predict (based on the results from the
514 current study) that enhancing teamwork through team building interventions would not only
515 improve teamwork itself but could also result in subsequent improvements in other variables,
516 including team cohesion, collective efficacy, commitment, enjoyment, and satisfaction with
517 performance. However, the extent to which those interventions that target teamwork truly impact
518 these (or separate) variables remains to be tested. Such an examination would provide additional
519 insight into the practical implications of this research—that is, with regard to the importance of

520 applied efforts to maximize the extent to which members of a sports team work effectively
521 together. In summary, testing these types of research questions in relation to team effectiveness
522 would help enhance our understanding of teamwork in sport and provide further support for
523 construct validation in relation to this construct (cf. Messick, 1995).

524 **Conclusion**

525 In summary, this is the first study to provide evidence that teamwork in sport is associated
526 with a range of adaptive group and individual variables. The findings also provide initial insight
527 regarding the mechanisms that may explain the relationships between athletes' perceptions of
528 teamwork and their subsequent satisfaction with performance from both an individual and team
529 perspective. Through this, further support for the validity—specifically, the external aspect of
530 validity—of data derived from the MATS is provided. These results suggest that teamwork is an
531 important variable to consider within the context of sport and that athletes, coaches, and applied
532 sport psychology consultants should aim to maximize the extent to which team members work
533 effectively together. Future research should continue to examine other aspects of validity and—
534 more broadly—examine how teamwork affects, and is affected by, additional variables of team
535 effectiveness within sport settings.

536

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619

Table 1

Descriptive statistics and intercorrelations for teamwork scores and sport outcomes related to team cohesion, collective efficacy, satisfaction with performance, player commitment, and player enjoyment.

Variable	<i>n</i>	M	SD	1a	1b	1c	1d	1e	2	3	4	5	6	7	8
1 Teamwork	175	5.14	1.08	.89*	.92*	.82*	.94*	.83*	.71*	.38*	.64*	.63*	.33*	.30*	.30*
1a Preparation	177	5.45	1.10	–	.81*	.71*	.75*	.64*	.65*	.34*	.63*	.56*	.35*	.37*	.32*
1b Execution	177	5.00	1.25		–	.70*	.84*	.72*	.67*	.36*	.60*	.57*	.23*	.19*	.22*
1c Evaluation	175	5.41	1.13			–	.77*	.54*	.49*	.34*	.50*	.48*	.29*	.22*	.20*
1d Adjustments	176	4.93	1.21				–	.81*	.68*	.35*	.56*	.61*	.30*	.24*	.26*
1e MTM	175	4.96	1.47					–	.69*	.33*	.52*	.58*	.32*	.30*	.30*
2 Task cohesion	178	6.55	1.73						–	.55*	.71*	.67*	.39*	.44*	.44*
3 Social cohesion	178	6.92	1.49							–	.48*	.41*	.28*	.26*	.22*
4 Collective efficacy	172	7.22	2.17								–	.71*	.31*	.30*	.36*
5 Team satisfaction	171	4.58	1.55									–	.28*	.20*	.25*
6 Individual satisfaction	171	5.41	1.04										–	.45*	.51*
7 Commitment	177	4.42	0.81											–	.68*
8 Enjoyment	177	4.46	0.83												–

Note: * $p < .001$. Scale ranges are 1-7 for teamwork, 1-9 for task and social cohesion, 1-10 for collective efficacy, 1-7 for satisfaction of individual performance and team performance, and 1-5 for commitment and enjoyment. The correlations between the five aspects of teamwork and the seven external variables are noted in bold.

Table 2

Effects of Teamwork on Satisfaction with Team Performance via Task Cohesion

Model	R ²	Direct Effects	Indirect Effects	CSIE
		<i>B</i> (SE), 95% CI	<i>B</i> (SE), 95% CI	<i>B</i> (SE), 95% CI
Preparation	.49*	.29 (.10), .09 – .49	.50 (.08), .36 – .65	.35 (.05), .26 – .45
Execution	.50*	.27 (.09), .09 – .44	.45 (.07), .32 – .59	.36 (.05), .26 – .46
Evaluation	.50*	.28 (.09), .11 – .45	.39 (.06), .27 – .52	.28 (.04), .19 – .36
Adjustments	.50*	.36 (.09), .17 – .55	.43 (.07), .30 – .57	.33 (.05), .23 – .43
MTM	.49*	.22 (.08), .06 – .38	.39 (.06), .28 – .52	.37 (.05), .27 – .47

Note. * $p < .001$. CSIE = Completely Standardized Indirect Effects

Table 3

Effects of Teamwork on Satisfaction with Team Performance via Social Cohesion

Model	R ²	Direct Effects	Indirect Effects	CSIE
		B (SE), 95% CI	B (SE), 95% CI	B (SE), 95% CI
Preparation	.37*	.67 (.09), .48 – .85	.12 (.04), .05 – .22	.08 (.03), .03 – .15
Execution	.37*	.60 (.08), .44 – .77	.11 (.04), .04 – .19	.09 (.03), .03 – .15
Evaluation	.29*	.53 (.10), .34 – .72	.14 (.04), .06 – .23	.10 (.03), .04 – .16
Adjustments	.40*	.69 (.08), .52 – .86	.10 (.04), .03 – .18	.07 (.03), .02 – .14
MTM	.38*	.53 (.07), .39 – .67	.09 (.03), .03 – .15	.08 (.03), .03 – .14

Note. * $p < .001$. CSIE = Completely Standardized Indirect Effects

Table 4

Effects of Teamwork on Satisfaction with Team Performance via Collective Efficacy

Model	R ²	Direct Effects	Indirect Effects	CSIE
		<i>B</i> (SE), 95% CI	<i>B</i> (SE), 95% CI	<i>B</i> (SE), 95% CI
Preparation	.52*	.26 (.10), .07 – .45	.52 (.07), .38 – .68	.37 (.05), .27 – .48
Execution	.53*	.28 (.08), .12 – .45	.43 (.06), .32 – .56	.34 (.05), .25 – .44
Evaluation	.52*	.23 (.08), .06 – .40	.44 (.07), .30 – .59	.31 (.05), .21 – .42
Adjustments	.59*	.40 (.08), .24 – .56	.38 (.06), .28 – .51	.29 (.04), .21 – .38
MTM	.55*	.31 (.06), .18 – .44	.31 (.05), .22 – .41	.29 (.04), .21 – .37

Note. * $p < .001$. CSIE = Completely Standardized Indirect Effects

Table 5

Effects of Teamwork on Satisfaction with Individual Performance via Enjoyment

Model	R ²	Direct Effects	Indirect Effects	CSIE
		<i>B</i> (SE), 95% CI	<i>B</i> (SE), 95% CI	<i>B</i> (SE), 95% CI
Preparation	.28*	.21 (.06), .08 – .33	.12 (.05), .03 – .23	.12 (.05), .04 – .23
Execution	.25*	.12 (.06), .01 – .23	.07 (.04), .00 – .15	.08 (.04), .01 – .18
Evaluation	.28*	.20 (.06), .08 – .32	.07 (.05), -.01 – .17	.07 (.05), -.01 – .18
Adjustments	.27*	.17 (.06), .06 – .29	.09 (.04), .02 – .17	.10 (.04), .02 – .19
MTM	.28*	.14 (.05), .05 – .24	.08 (.03), .03 – .15	.12 (.04), .04 – .21

Note. * $p < .001$. CSIE = Completely Standardized Indirect Effects

Table 6

Effects of Teamwork on Satisfaction with Individual Performance via Commitment

Model	R ²	Direct Effects	Indirect Effects	CSIE
		<i>B</i> (SE), 95% CI	<i>B</i> (SE), 95% CI	<i>B</i> (SE), 95% CI
Preparation	.22*	.21 (.07), .08 – .35	.11 (.04), .04 – .19	.12 (.04), .04 – .20
Execution	.20*	.14 (.06), .02 – .25	.05 (.03), .00 – .12	.06 (.04), .00 – .14
Evaluation	.22*	.20 (.06), .07 – .33	.07 (.04), -.01 – .15	.07 (.05), -.01 – .17
Adjustments	.23*	.19 (.06), .07 – .31	.07 (.03), .01 – .14	.08 (.04), .01 – .16
MTM	.22*	.16 (.05), .06 – .26	.07 (.03), .02 – .13	.10 (.04), .03 – .18

Note. * $p < .001$. CSIE = Completely Standardized Indirect Effects